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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/065,373	10/10/2002	Mark A. Lillis	PES-0075	1008

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EXAMINER	
RUTHKOSKY, MARK	

ART UNIT	PAPER NUMBER
1745	

DATE MAILED: 12/15/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No. 10/065,373	Applicant(s) LILLIS, MARK A.
	Examiner Mark Ruthkosky	Art Unit 1745

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *30 November 2005*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *11-16 and 21-29* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *11-16 and 21-29* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

Claims 11-16 and 21-29 are rejected under 35 U.S.C. 103(a) as being unpatentable over Andrews et al. (US 6,036,827) in view of Ono et al. (JP 401066537 A), as evidenced by Bhandari et al. (US 6,006,582.)

The instant claims are to a process for operating an electrochemical system, comprising calibrating a hydrogen gas detector by passing a hydrogen-free gas through a first conduit to the hydrogen detector, wherein the hydrogen gas detector generates a first signal; flowing a known quantity of hydrogen gas from a hydrogen/water separator through a second conduit to the hydrogen gas detector, wherein the hydrogen gas detector generates a second signal corresponding to a percentage of the hydrogen gas in the mixture; and calibrating the hydrogen gas detector based upon the first and second signals; introducing water to an electrolysis cell; producing hydrogen; separating hydrogen from water in the hydrogen/water separator; introducing environmental gas disposed around electrochemical system components to the hydrogen gas detector; and determining the hydrogen concentration in the environmental gas.

Andrews et al. (US 6,036,827) teaches a process for operating an electrochemical system by introducing water to an electrolysis cell; producing hydrogen; separating hydrogen from water

in a hydrogen/water separator; introducing environmental gas disposed around electrochemical system components to a hydrogen gas detector; and determining the hydrogen concentration in the environmental gas (see col. 7, line 30 to col. 8, line 50 and col. 21, line 50 to col. 22, line 10.) The reference will inherently pass gasses through a conduit to the hydrogen detector. The reference teaches that if the detection of hydrogen is at a high concentration the hydrogen source would be shut down and the hydrogen and the carrier gas would dissipate into the atmosphere (col. 34, lines 1-11; col. 21, line 60 to col. 22, line 15.)

The reference does not teach calibrating a hydrogen gas detector by passing a hydrogen-free gas through a first conduit to the hydrogen detector, wherein the hydrogen gas detector generates a first signal; flowing a known quantity of hydrogen gas from a hydrogen/water separator through a second conduit to the hydrogen gas detector, wherein the hydrogen gas detector generates a second signal corresponding to a percentage of the hydrogen gas in the mixture; and calibrating the hydrogen gas detector based upon the first and second signals.

The calibration of a measuring device, such as a detector, is well known in the art for providing an accurate reading by the device. For example, Ono et al. (JP 401066537 A) teaches a method of detecting hydrogen gas in a detector including the step of calibrating a hydrogen gas detector by passing a hydrogen-containing gas into hydrogen detector, wherein the hydrogen gas detector generates a first signal to determine a correlation between the concentration of hydrogen and an output signal of the hydrogen gas detector. This is followed by flowing an unknown concentration of hydrogen in a non-hydrogen gas through a second conduit (figure 1) to the hydrogen gas detector, wherein the hydrogen gas detector generates a second signal corresponding to a percentage of the hydrogen gas in the mixture. The concentration of hydrogen

is calculated by a calibration curve formula derived from known concentrations of hydrogen compared with the output signal of the hydrogen gas detector. The reference does not disclose the method at applied temperatures or pressures thus, the system is considered to be at ambient values. The calibrating system includes a sample gas injector, an air pump, a reference hydrogen-measuring device, a hydrogen gas detector, a measuring cell to give a known quantity of gas for measuring, various conduits and interfaces, and a data processor (figure 1.)

It would be obvious to one of ordinary skill in the art at the time the invention was made to calibrate a detector using known concentration standards in order to determine that a signal produced by the detector is accurate for the known standard. The detector may be adjusted to give the proper signal if necessary. This is well known for devices such as detectors, scales, sensors and the like. It would be obvious to one of ordinary skill in the art at the time the invention was made to calibrate the hydrogen gas detector taught by Andrews et al. (US 6,036,827) using the method of calibrating the detector by comparing adjusted output signals based on the known concentration of hydrogen, as taught by Ono et al. (JP 401066537 A), in order to accurately detect the hydrogen concentration in an environmental gas as desired by Andrews. Further, it would be obvious to use various *known* concentrations of hydrogen in order to develop the calibration curve as disclosed in Ono. Introducing a hydrogen-free gas provides a low-end signal value for calibration. Using air as the hydrogen free gas would be obvious to the skilled artesian as the baseline value as hydrogen is generally not a component of air.

Bhandari et al. (US 6,006,582) teaches hydrogen sensors used for detecting hydrogen concentrations in devices. The reference discloses that hydrogen sensors require calibration including clean air calibration in order to determine the proper detection based on the materials

of the sensor (col. 1, line 64 to col. 2, line18.) Measuring a larger number of known concentration points in the calibration of a detector will give a more accurate calibration of the detector over a broader range of concentrations.

The references do not teach flowing a known quantity of hydrogen gas from a hydrogen/water separator through a second conduit to the hydrogen gas detector; however, Ono teaches that the calibration system for the detector includes a measuring cell. One of ordinary skill in the art would recognize that a source of hydrogen gas is available from the hydrogen generating system taught in Andrews et al. (US 6,036,827) where hydrogen is collected with a hydrogen/water separator and that the quantity of sample gas would be determined in the measuring device taught in the Ono system in order to provide a known quantity of hydrogen to calibrate the system as taught by Ono. The Ono reference teaches using a gas metering device and a measuring cell to measure the amount of hydrogen from the gas injector (figure 1.)

With regard to claim 13, the background section of the instant specification teaches that coupling hydrogen producing electrolysis cells with fuel cells is well known in the prior art, forming regenerative fuel cells. The background further notes that calibrated hydrogen gas detectors for regenerative fuel cell systems are well described. It would be obvious to one of ordinary skill in the art at the time the invention was made to couple the hydrogen and oxygen of the electrolyzer to a fuel cell in order to generate electricity as the coupling of the hydrogen source to a fuel cell is well known in the art to fuel a fuel cell and generate electricity.

With regard to claims 25-27, it would be obvious to one of ordinary skill in the art to recalibrate the hydrogen detector of Andrews in order to provide an accurate reading of the amount of hydrogen in a sample gas. Calibrating a detector is well described. Recalibrating

would be obvious to the skilled artesian to reduce the possibility of error in the event that the detector drifts from its proper output. The artesian would have found the claimed invention to be obvious in light of the teachings of the references.

Response to Arguments

Applicant's arguments filed 11/30/2005 have been fully considered but they are not persuasive. It is noted that the rejections have been altered to more accurately describe the teachings of the prior art.

With regard to the applicant's statement questioning if the examiner is taking official notice that it is known in the art to operate an electrochemical system, including calibration of a hydrogen detector, based on the indented statement highlighted on the top page 9, the examiner notes that the cited passage on page 9 does not state "that it is known in the art to operate an electrochemical system, including calibration of a hydrogen detector". The background of the instant specification notes that calibrating hydrogen gas detectors of regenerative fuel cell systems is well established.

The applicant argues that the sensitivity and accuracy of hydrogen gas detectors drift over time and that the claimed method allows the hydrogen detector to be calibrated to adjust for the drift. The method comprises passing a hydrogen-free gas to a hydrogen detector that generates a first signal. The process then includes the step of flowing a known quantity of hydrogen gas to the detector that generates a second signal corresponding to a percentage of hydrogen gas in the mixture. The detector is then calibrated based on the first and second signals. The applicant

notes that the claim requires the use of both a hydrogen free gas and a known quantity of hydrogen gas, as well as two detector signals that correspond to each gas.

As noted in the final rejection of 9/30/2005, the Ono reference does <u>not</u> teach using more than one point for the calibration of the hydrogen detector. The reference teaches that the reference hydrogen gas is introduced to the cell to determine a correlation between the concentration of hydrogen and an output signal of the hydrogen gas detector. The concentration of unknown concentrations of hydrogen gas is calculated using a calibration curve formula stored in a computer processor compared with an output signal of the detector.

The applied rejection is based on 35 U.S.C. 103 and states that it would be obvious to calibrate the hydrogen gas detector taught by Andrews et al. (US 6,036,827) using the method of comparing relative output signals based on the known concentration of hydrogen, as taught by Ono et al. (JP 401066537 A) in order to accurately detect the hydrogen concentration in the environmental gas (page 4, lines 3-7 and 13-15) and that it would be obvious to use various known concentrations of hydrogen in order to develop a calibration curve for the detector including a hydrogen free gas. This will provide a low-end signal value for calibration. As stated in the rejection, using more points in the calibration of a detector will give a more accurate calibration of the detector over a broader range of concentrations. Support for this is known in the art and found in Bhandari et al. (US 6,006,582.)

It is noted that the Ono reference teaches that the hydrogen detector output signal is compared with a curve that has known output signals *for known concentrations of hydrogen*. The concentrations of hydrogen and the corresponding signal must be known for various points in order to give this comparison. The examiner is not arguing that a known *detector calibration*

for various points is measured in the cited reference, but the comparative output signal for *various concentrations* is taught for comparison of a measured signal to give a concentration of hydrogen gas. The reference teaches measuring a known quantity of hydrogen for calibrating the detector. It would be obvious to one of ordinary skill in the art at the time the invention was made to use more than one known concentration point in order to calibrate the detector signal over a broad range.

The applicant admits in the background section of the specification that manual calibration of detectors in electrochemical systems has been done in the past, but there is no teaching of operating an electrochemical system as claimed. It is noted that the instant claims do not preclude manual calibration of the detector when coupled with the electrolyzer taught in Andrews.

With regard to the applicant's arguments that there is no motivation to combine the teachings of the Ono with the teachings of the Andrews reference, this is not persuasive, as the skilled artesian would understand that the calibration of detectors is proper to ensure that the measured readings are accurate. This is standard practice in the art of measuring and is noted in Ono for giving a correlation between the hydrogen concentration and the signal of a detector. For these reasons, the claims are rejected as being obvious over the prior art.

Examiner Correspondence

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Mark Ruthkosky whose telephone number is 571-272-1291. The examiner can normally be reached on FLEX schedule (generally, Monday-Thursday from 9:00-

6:30.) If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Patrick Ryan can be reached at 571-272-1292.

The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306. Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free.)

Mark Ruthkosky
Primary Patent Examiner
Art Unit 1745

12/9/2005